

# PATENT SPECIFICATION

692,824



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## COMPLETE SPECIFICATION

### Personal Equipment for Aircraft Pilots

I, RALPH EDWIN DARLING, a citizen of the United States of America, residing at 404 Fairfax Road, Bethesda, Montgomery County, Maryland, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to personal equipment for aircraft pilots, and others, embodied in a readily detachable assembly of the pilots smooth bore oxygen breathing gear, for use in highspeed aircraft while in flight and from which a pilot may with safety be automatically ejected from the cockpit with his seat and parachute, through an open canopy into space preparatory to being airborne by his parachute.

The improved oxygen gear includes a standardized type of trunkline hose, and a sectional extension thereof forms the pilots hose to provide a continuous and reliable flow of air and oxygen, under pressure, to the pilots mask; and the hose assembly also carries electrical circuits to earphones, a microphone, radio, or other electrical instruments serving the pilot.

The trunkline hose or console attachment and its extension forming the pilots hose, are of reinforced elastic and resilient material, and they are adapted for interchangeable or selective use with existing equipment. The standardized hose sections are equipped with invisible and unobstructed electrical wires, and the hose sections are jointed by means of separable connectors each consisting of plug-and-socket units that are provided with coacting fasteners, and electrical contacts or terminals forming automatically operated switches, or circuit makers and breakers. The adjoining ends of hose sections are united by a two-unit connector, and the two sections of the hose are safely combined and arranged for quick and automatic separation by and with the

initial movement of the ejecting operation of the pilot and his seat. The separation or disconnection of the pilots hose section, with the pilot's ejected seat, from the trunkline or console section of hose is facilitated and assured with safety by a swivel anchor of the pilots hose section on the pilots seat. Upon operation or upward movement of the ejected seat, the seat-mounted and swivelled connector is axially aligned with the component force of ejection, and therefore a quick positive disconnection is effected without affecting the pilot.

The improved equipment of the invention involves a minimum number of standardized parts that may be manufactured with facility, the parts may be assembled and adjusted with ease preparatory to a flight by the pilot, and the mechanical and electrical parts of the equipment are combined and arranged to insure safety, durability, a maximum of efficiency with a minimum of bulk and weight, and to occupy a minimum of space in the cockpit of an aircraft.

In co-pending application No. 5447/51 (Serial No. 691,224) there is described and claimed the combination with a pilot's oxygen breathing hose of elastic and resilient material and having a connector unit attached at each of its ends, of a coiled wire spring integrated within the wall of the hose, electrical conducting wires spirally arranged and integrated within the wall of the hose to form a circuit, and terminal electrical contacts for said conducting wires mounted in said connector units.

In Specification No. 685,812 there is described and claimed oxygen breathing equipment including an elastic and resilient oxygen hose having continuous inner and outer helical ribs terminating in an integral coupling sleeve at either end, a plurality of electrical conductor wires forming a cable, arranged in the valley formed by the outer rib, a protective sheath encasing the

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hose, and conductor wires, and spaced supporting means on the hose for leading in and for leading out the electrical conductors.

5 In the accompanying drawings I have illustrated one complete example of an embodiment of my invention wherein the parts are combined and arranged in accord with one mode I have devised for the  
10 practical application of the principles of the invention. It will, however, be understood that changes and alterations are contemplated and may be made in these exemplifying drawings and structures, within the scope of my claims, without  
15 departing from the principles of the invention.

Figure 1 is a diagrammatic view in side elevation showing a pilot in his seat and  
20 means for ejecting the occupied seat, together with the arrangement of the oxygen breathing hose equipped with the required electrical connections. Figure 2 is an inner face view of a section of a plug-unit of a connector, as for instance shown with  
25 the pilots mask; and Figure 3 is a face view of this connector.

Figure 4 is an inner face view of a section of the complementary socket unit, as of the  
30 pilots connector; and Figure 5 is an end view of this socket-unit. Figure 6 is an enlarged detail view partly in section at one end of a reinforced hose section, showing also the electrical circuit wires  
35 integrated in the wall of the hose.

Figure 7 is an inner face view of sections of the units of the swivelled connector, with end portions of hoses clamped within the sectional units of the connector.  
40 Figure 8 is a detail elevation of the swivel connector unit and its seat support; Figure 9 is a top plan view of this structure; and Figure 10 is an enlarged detail sectional view of the mount for the swivel bolt.  
45 Figures 11 and 12 are detail sectional views broken away, showing the plug-and-socket connections in a connector for the electrical circuits.

Figure 1 shows a portion of a fixed frame  
50 F that is located in the cockpit of an aircraft, and from which the pilots seat S may be ejected upwardly at the usual inclination through the upper open canopy of the cockpit. For this purpose any suitable  
55 mechanism may be employed, as for instance the back of the seat may be equipped with power-operated mechanism such as a rod R that initially extends downwardly into the interior of a cylinder C  
60 forming an expansion chamber and rigidly mounted upon the frame F. The base B of the cylinder which forms a firing or explosion chamber is equipped with means such as an explosive charge which by means of  
65 detonation and expansion of gases of

combustion against piston P, causes the piston to contact the lower end of the rod for ejecting the occupied pilot's seat.

The invention embodies the personal gear or equipment of the pilot including his  
70 flying suit 1, with the body hose or lead (not shown) for anti-G pressure from the console receptacle 2, and the oxygen breathing trunk line hose 3 of rubber or  
75 other suitable elastic and resilient material that is anchored at 4 to the console. A sectional extension of the trunk line hose includes separable hose sections 5 and 6, one end of the former being anchored to the seat S, and an end of the latter being  
80 attached to the mask 7 for use by the pilot. The lower end of the trunk line is equipped with a connector unit 8 that anchors it to the console receptacle, and the upper end of this hose is equipped with  
85 a socket connector unit 9 that is detachably connected with a plug unit 10 mounted at one end of the extension 5, and this plug-unit of the pilot's hose is swivelled or pivoted on a portion of the pilot's seat S.  
90

The extensions 5 and 6 forming the pilot's hose and attached to the mask 7 are connected by units 11 and 12 and the extension forming the pilot's hose may be  
95 loosely supported or suspended from the pilot's suit, or the parachute harness, as by means of a snap hook D that is mounted on the socket-unit for use with a complementary eyelet on the suit or harness. The rearwardly extending pilot's hose  
100 passes under the left arm of the pilot to the swivelled connector unit 10 that is mounted on the left side of the pilot's seat. Each of these reinforced elastic and resilient non-collapsible hose sections has integrated in  
105 its wall a helical or spirally arranged wire spring 13 that is encased or embedded within an exterior continuous spiral rib or ridge 14, to add strength and resiliency to the rubber or other elastic material of  
110 the hose.

In addition to the function of conveying breathing oxygen to the pilot, the hose  
115 sections also form carriers for the electrical circuit wires of the pilot's service instruments, and these wires or conductors are integrated with the walls of the hose sections to insure against breakage, short  
120 circuiting, or entanglement with other accessories. The conductor wires, which are located between the coils of the spiral reinforcing spring, also reinforce the elastic walls of the hose sections against lateral and excessive pressure and expansion that would deform the hose, as the oxygen  
125 under pressure flows therethrough.

The continuous spiral ribs of each hose section form a continuous spiral groove 15 in the wall of the hose, and within the hose wall a suitable number (here shown as four)  
130

of lead wires or spirally arranged conductors 16—17 and 18—19 are encased to form two electrical circuits. The opposite ends of these wires pass outwardly through the base portions of integral end nipples or attaching sleeves 20 of the elastic hose, for connection with pairs of electrical contacts or terminals mounted within the hollow plug-and-socket units of a connector. Each of the several enumerated connectors, that form detachable joints between the hose sections, consists of a socket-unit and a plug-unit of suitable material, and each unit is made up of complementary sections having interior voids, the sections of each unit being united by screw bolts and countersunk clamp nuts.

Within each sectional unit of a connector is encased an oxygen connector tube 22, of aluminium, hardened plastic, or other appropriate material, and over a plane end of each angular connector tube the attaching sleeve 20 and one or two of the spiral ribs 14 of the oxygen hose are fitted and securely clamped within the sectional connector units.

The connector tube 22 of a plug-unit terminates in a tapered tubular head or plug 23 having an exterior packing gasket 24, and this plug or attaching head is equipped with an exterior split resilient ring 25 forming part of a snap-joint for insertion into a complementary socket 26 of the tube in the socket-unit of the connector. The end socket 26, which receives the attaching plug is fashioned with an exterior annular rib 27 that forms an inner annular groove or seat for the resilient split ring, and this connection provides an ample breaking force, say eighty pounds, that is sufficient to preclude inadvertent disconnection of the jointed hose sections.

The two pairs of wires for the electrical circuits are attached to two sets of detachable terminals that are preferably mounted in inset insulating blocks, as 28, which extend transversely of the plug and socket units and are rigidly clamped between the adjoining sections of a unit. The insulating block of a plug unit has embedded therein a pair of contact pins 29, as best seen in Fig. 11, that are inserted within and coact with a pair of sockets or conducting tubes 30 that are fixed within the insulating block 20 of the socket unit of a connector. For connecting the wires of the other circuit the plug unit of a connector is equipped with a composite plug or jack that includes a central pin 32 having a spherical contact head which is encased within and insulated from a conducting sleeve 33, and the respective wires are attached to the central pin and to its insulated jacket or sleeve. The complementary socket unit of this electrical connection

includes a semi-cylindrical or cut-away conducting tube 34 embedded in an insulating block and to which one wire is attached, and a resilient conductor blade 35 for frictional engagement with the spherical conducting head of the plug, is mounted in and insulated from the conducting tube, and connected to the other circuit wire.

The plug unit 10 of the swiveled connector is pivotally suspended upon a transversely arranged bolt 36 that is secured at opposite sides of the unit by clamp nuts 37 countersunk in the opposite faces of the unit, and the bolt is fashioned with a spherical head 38 that is pivotally mounted in a threaded socket block or holder 39. This holder or block 39 is secured in suitable manner against the front face of the pilots seat back, as by screws 40. For assembling the swivel joint the neck of the bolt is slipped through a slot 41 of the holder and the head is seated in the socket, after which the swivel head is secured in adjusted position by a pair of screw plugs 42 and 43, the lower one of which has a concave bearing face on the swivel head.

By means of this swivel joint, the upper end of the trunk line hose and the lower end of the pilots hose may freely swing on the swivel support, and the initial upward movement of the seat during the ejection operation, swings the connector from the position of Fig. 1 into an upright position axially aligned with the component force of ejection, to assure a quick and easy disconnection of the unit 10 from the unit 9, leaving the trunkline hose anchored to the console receptacle.

What I claim is:—

1. The combination with a pilot's seat for an aircraft having a support within the cockpit of the aircraft for guiding said seat in an upward movement, and means for ejecting the seat from the cockpit, of personal equipment including a sectional oxygen hose, a connector including a pair of separable units uniting adjoining ends of the sections of the hose, means for swivelling one of said units on the seat, and means for anchoring one of said sections within the cockpit.

2. The combination as claimed in claim 1, wherein the oxygen hose is of elastic and resilient material and includes electrical conductor wires integrated with the walls of the hose-sections, with separable electrical contacts for the conductor wires mounted in said units.

3. The combination as claimed in claim 1 or 2, wherein the unit of the connector swivelling on the seat is attached to the section of the oxygen hose forming the pilot's hose, the complementary unit forming said connector being attached to the section of the hose anchored within

the cockpit, said units forming the connector comprising a plug unit co-acting with a socket unit.

4. The combination as claimed in claim 2  
5 or 3, wherein the elastic and resilient oxygen hose has an exterior spiral ridge and a coiled spring integrated in said ridge,

and said ridge forming an exterior spiral groove in the wall of the hose, said conductor wires being integrated within the wall 10 of the hose between said ridges.

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FIG. 2.

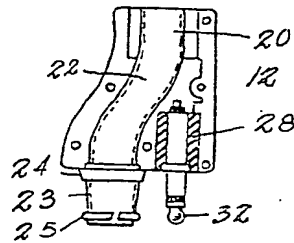


FIG. 3.

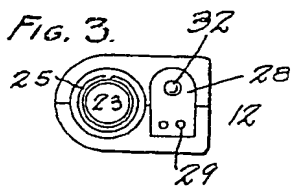


FIG. 4.

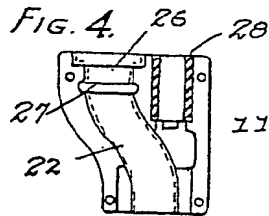


FIG. 5.

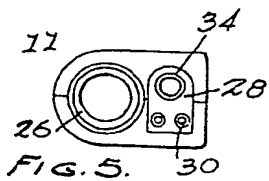


FIG. 1.

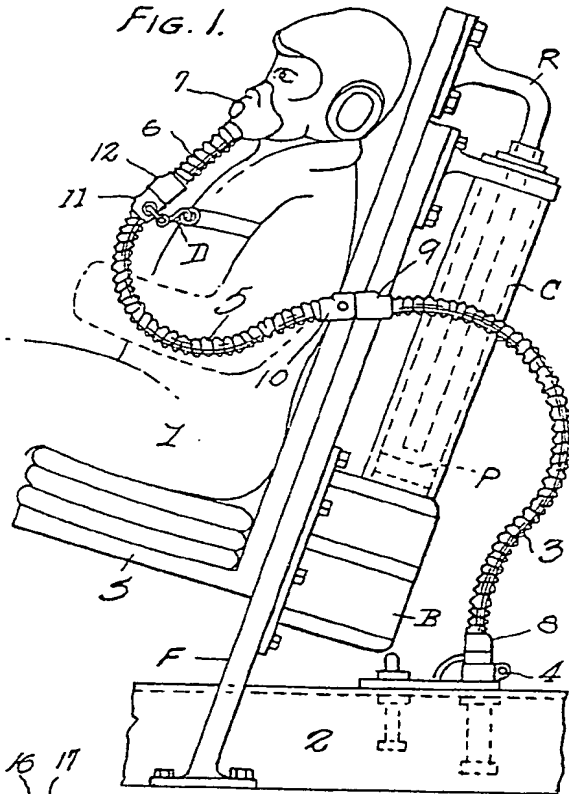
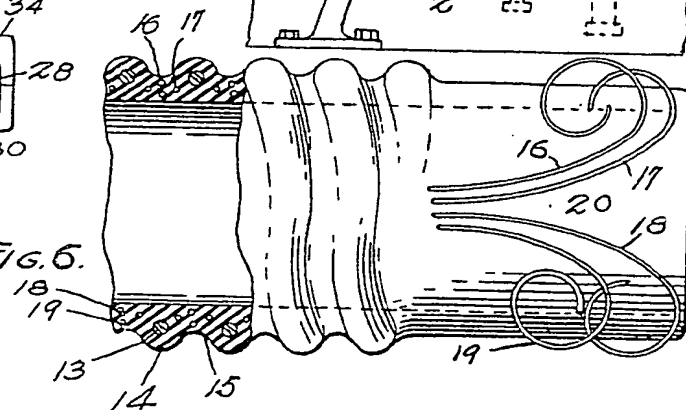


FIG. 6.



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2 SHEETS

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SHEETS 1 & 2

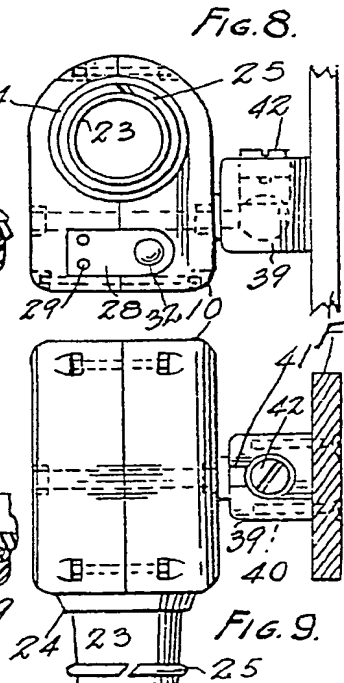
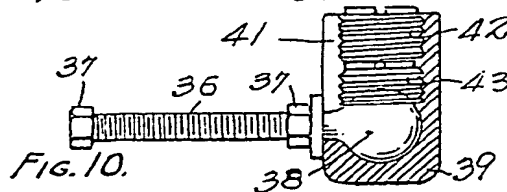
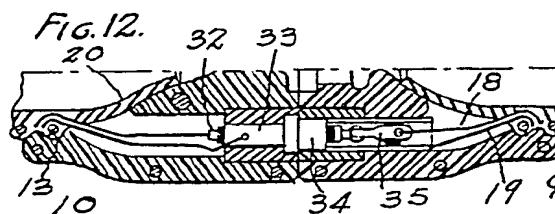
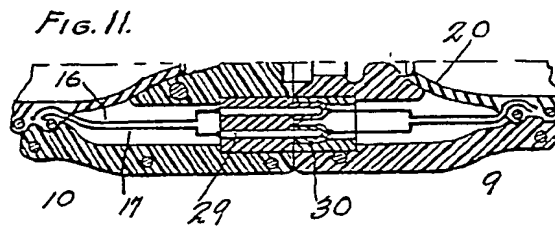
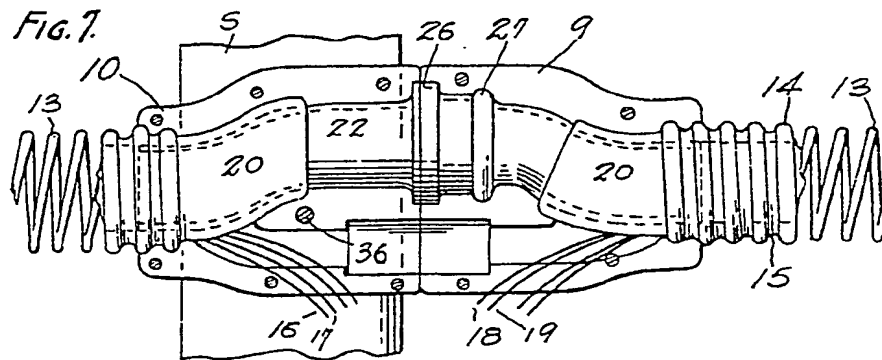
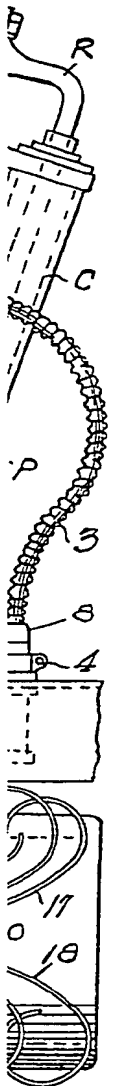
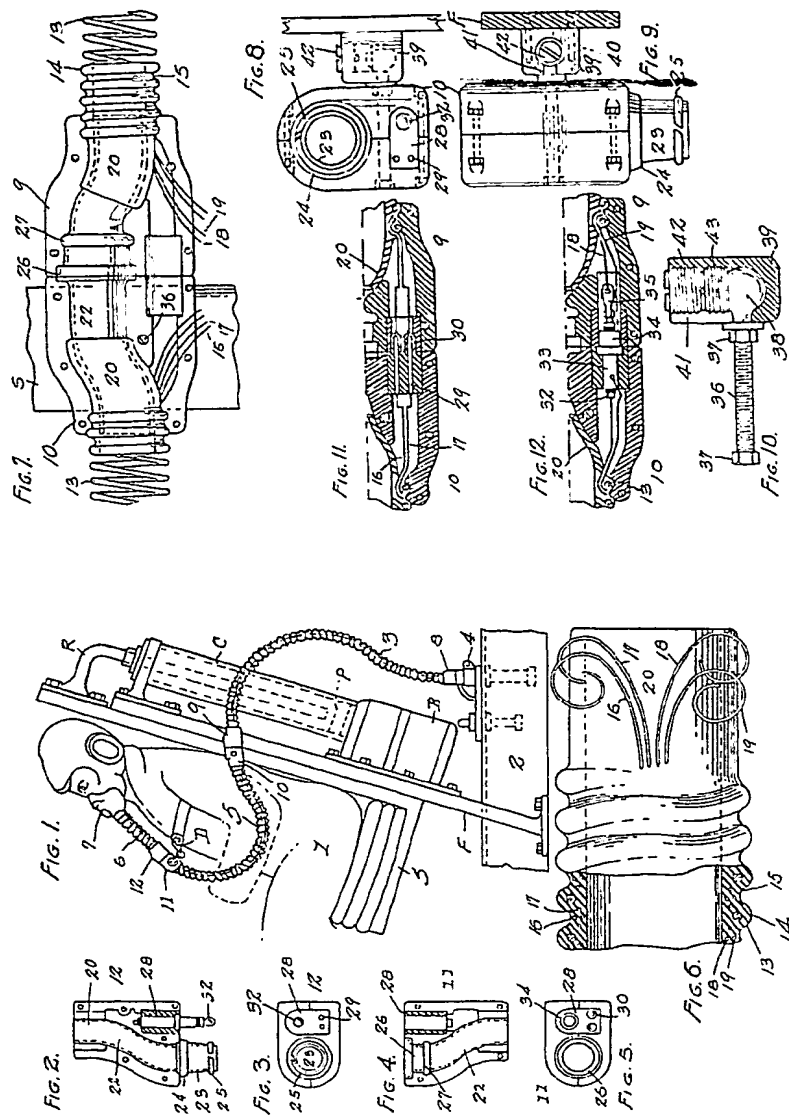


FIG. 9.





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